

Challenging Genetic Dogma: Testing Whether Modularity is a General Feature of the Switches that Control Animal Gene Use



by Katherine Kohnen (Premedical Program, University of Dayton)

Genetics, morphology, and diversity



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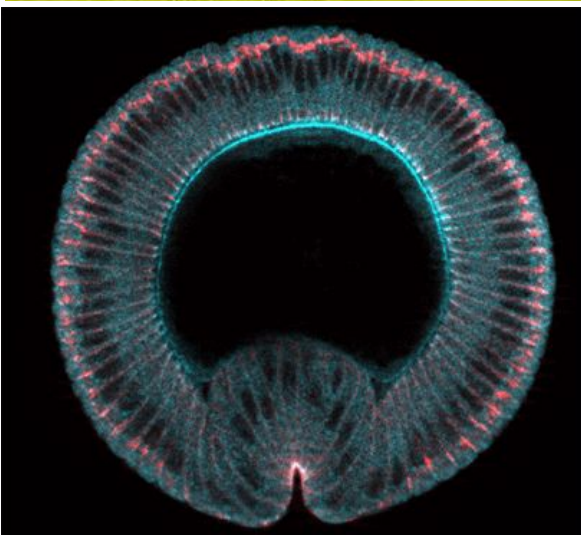
Genetics, morphology, and diversity



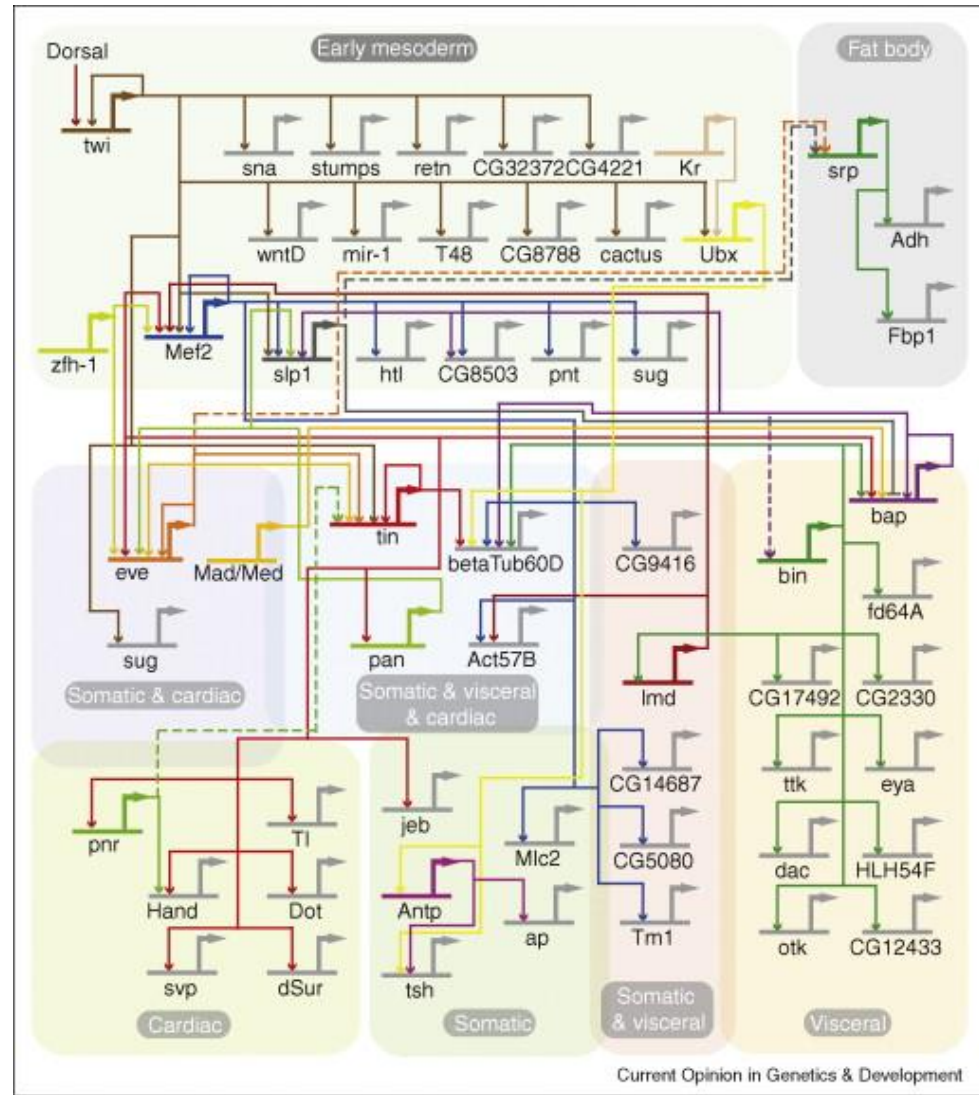
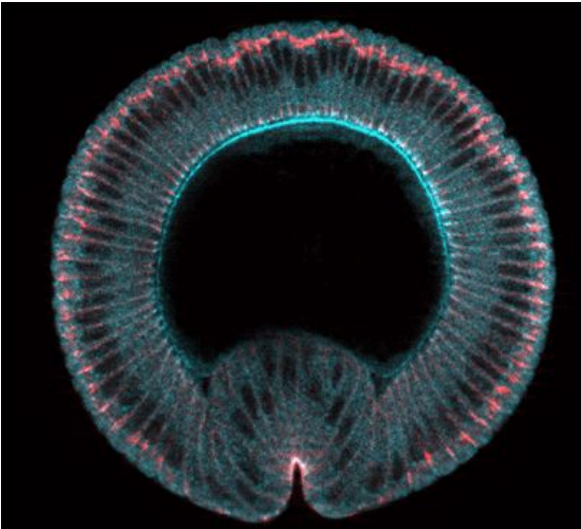
Morphological Trait Diversity at Three Levels



Development and Gene Regulatory Networks

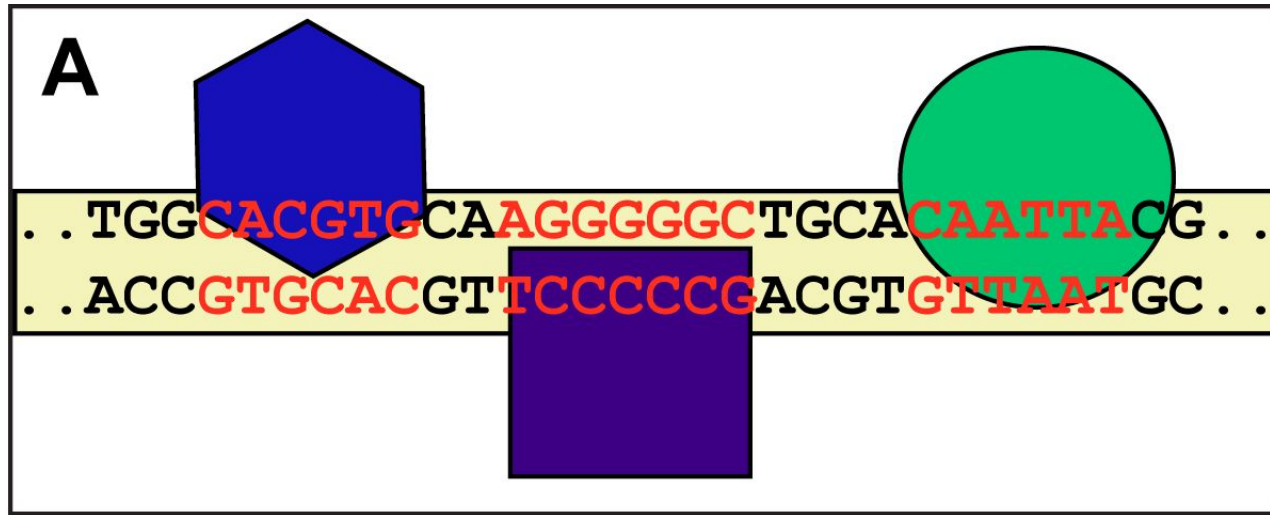


Development and Gene Regulatory Networks

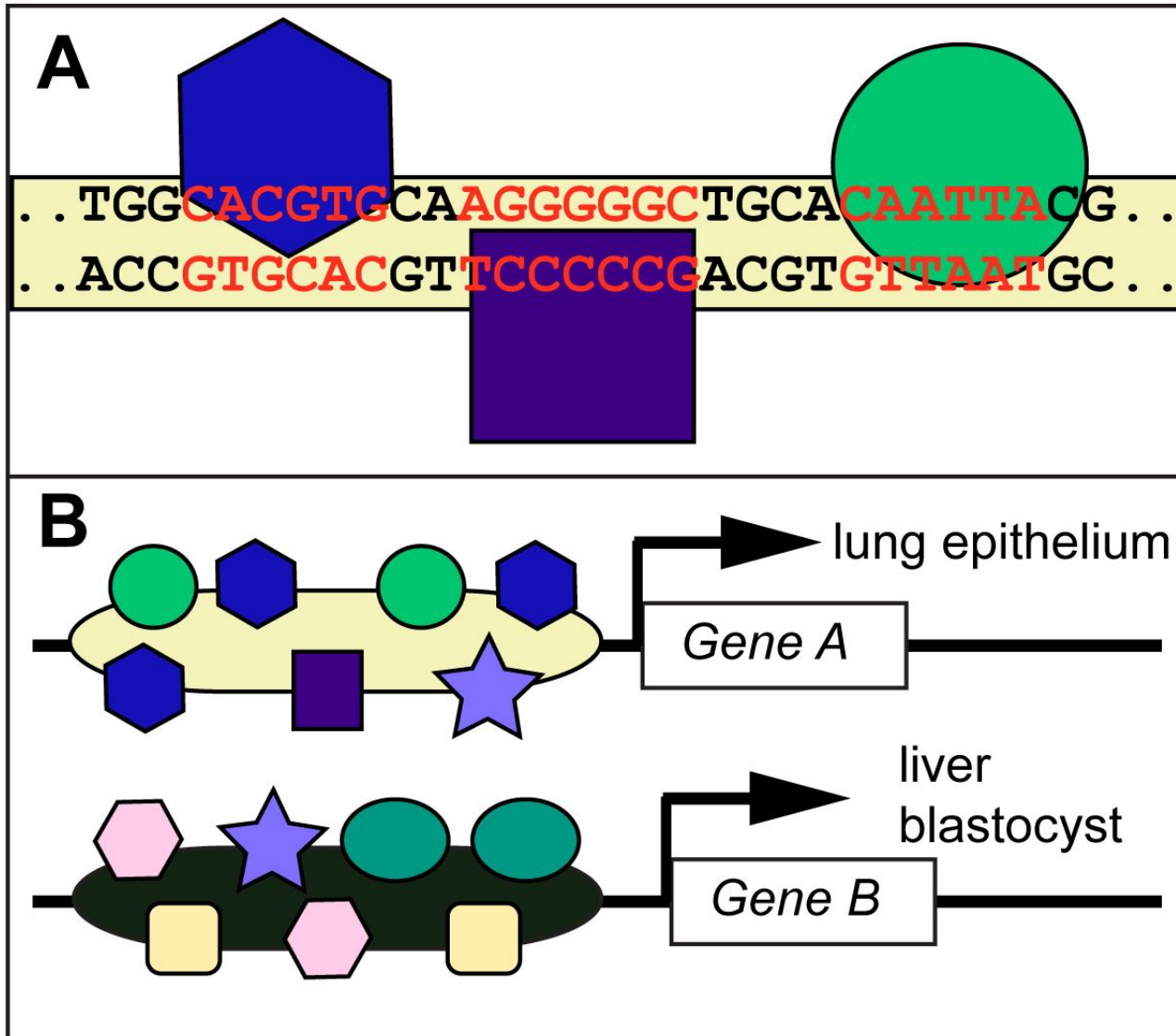


Bonn and Furlong
(Current Opinion in Genetics & Development, 2008)

The regulatory logic responsible for CRE function

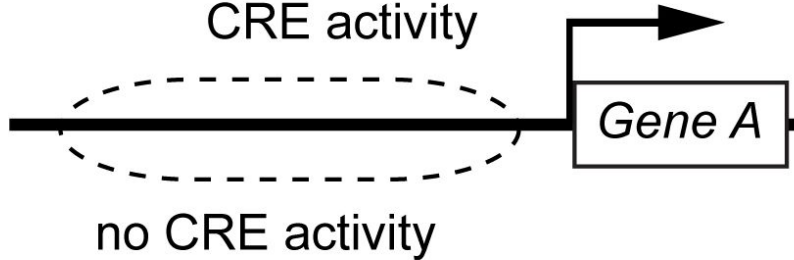


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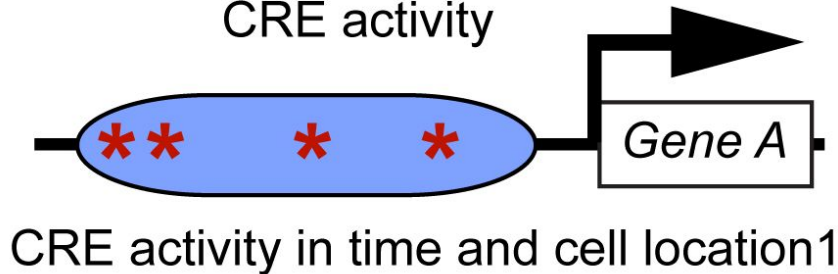


How do the regulatory logic of CREs evolve?

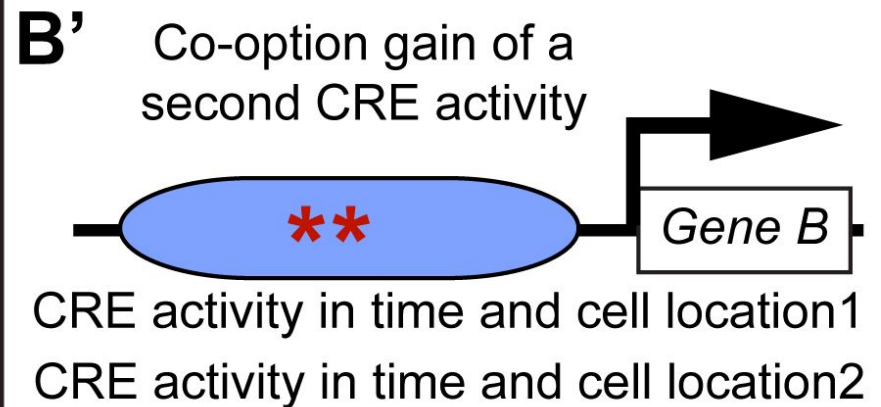
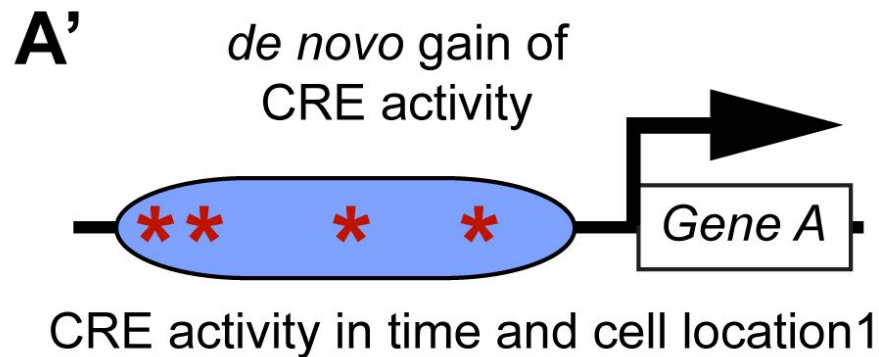
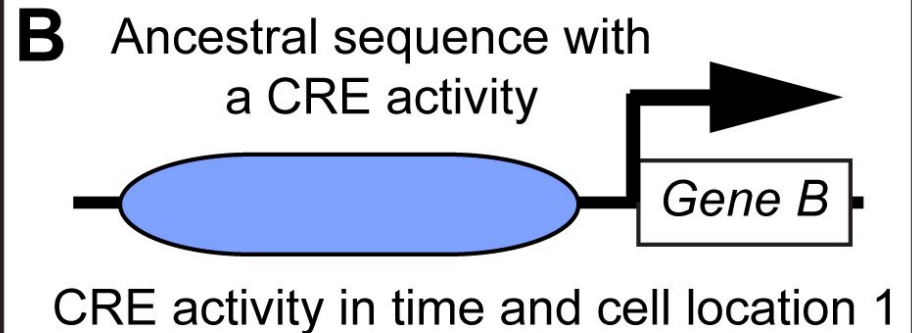
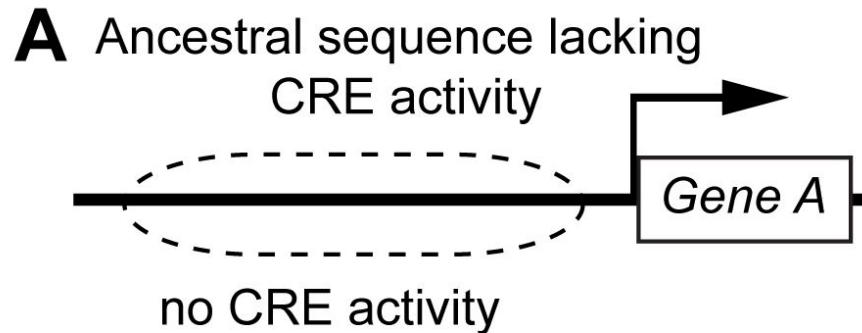
A Ancestral sequence lacking
CRE activity



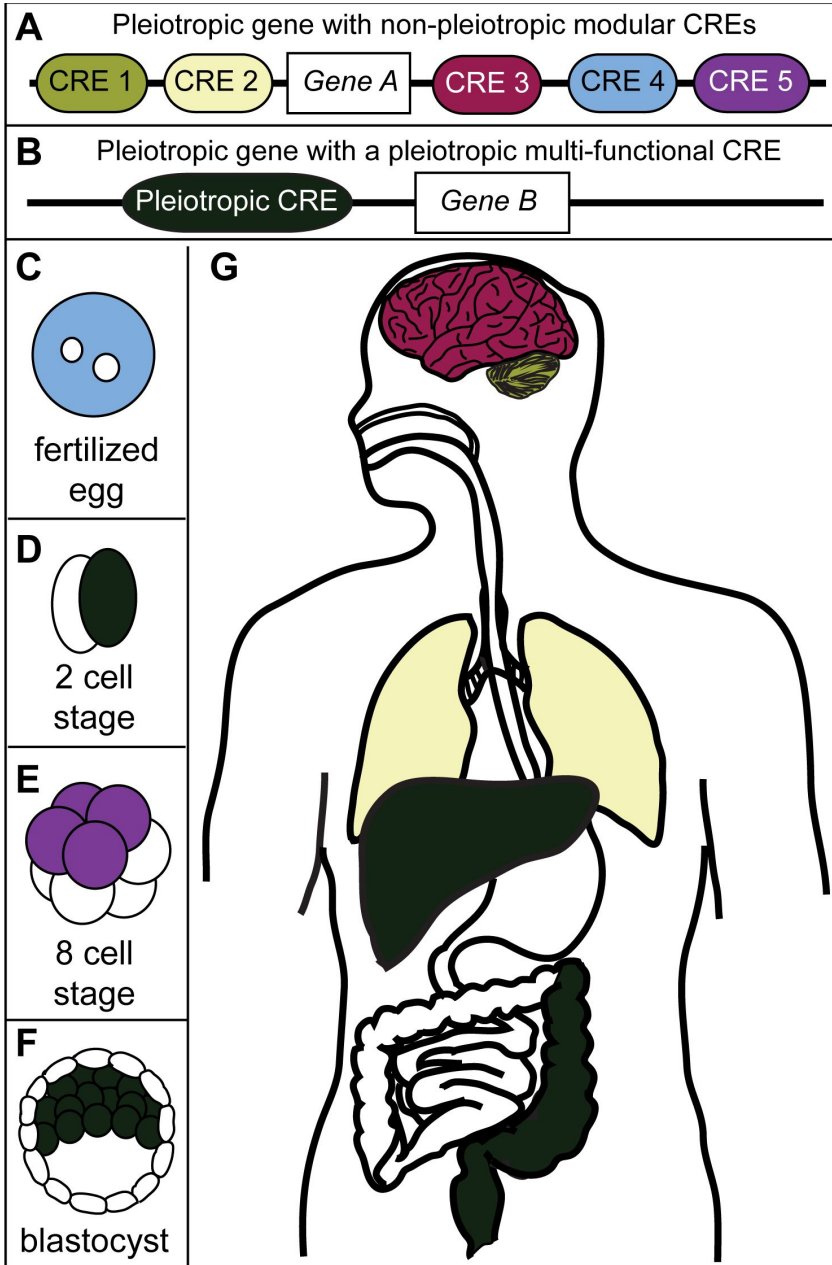
A' *de novo* gain of
CRE activity



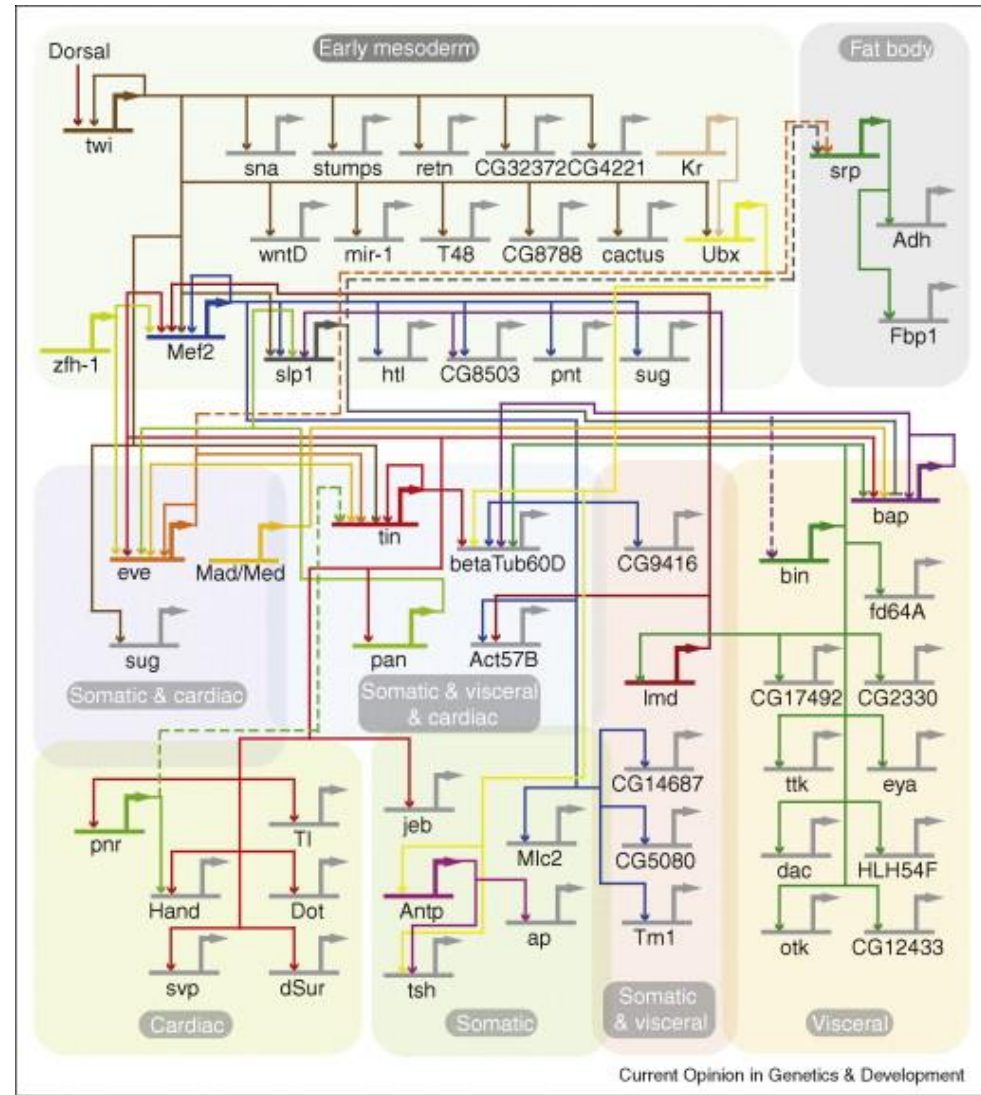
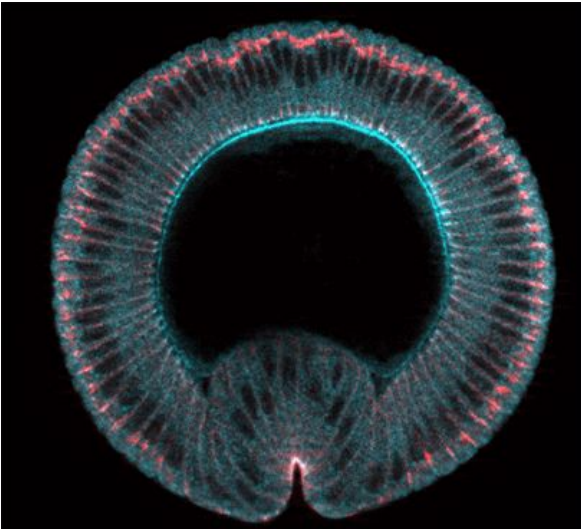
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Competing models for gene expression regulation by CREs

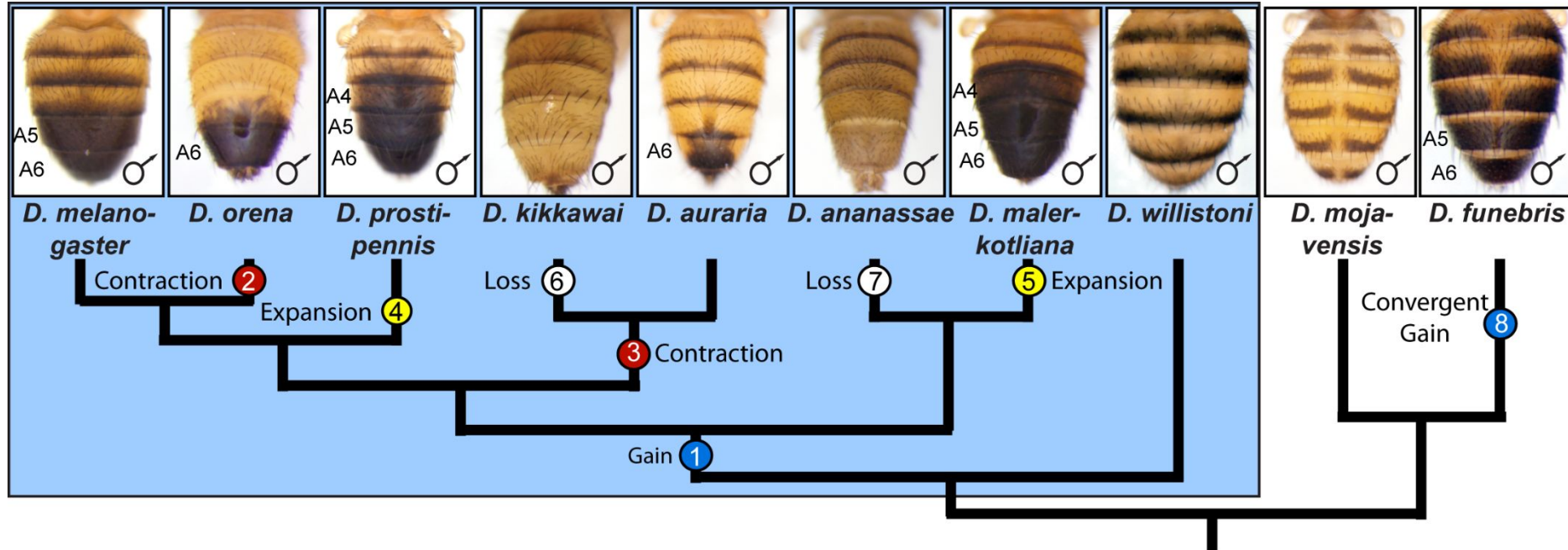


Gene Regulatory Networks and the Evolution of Development

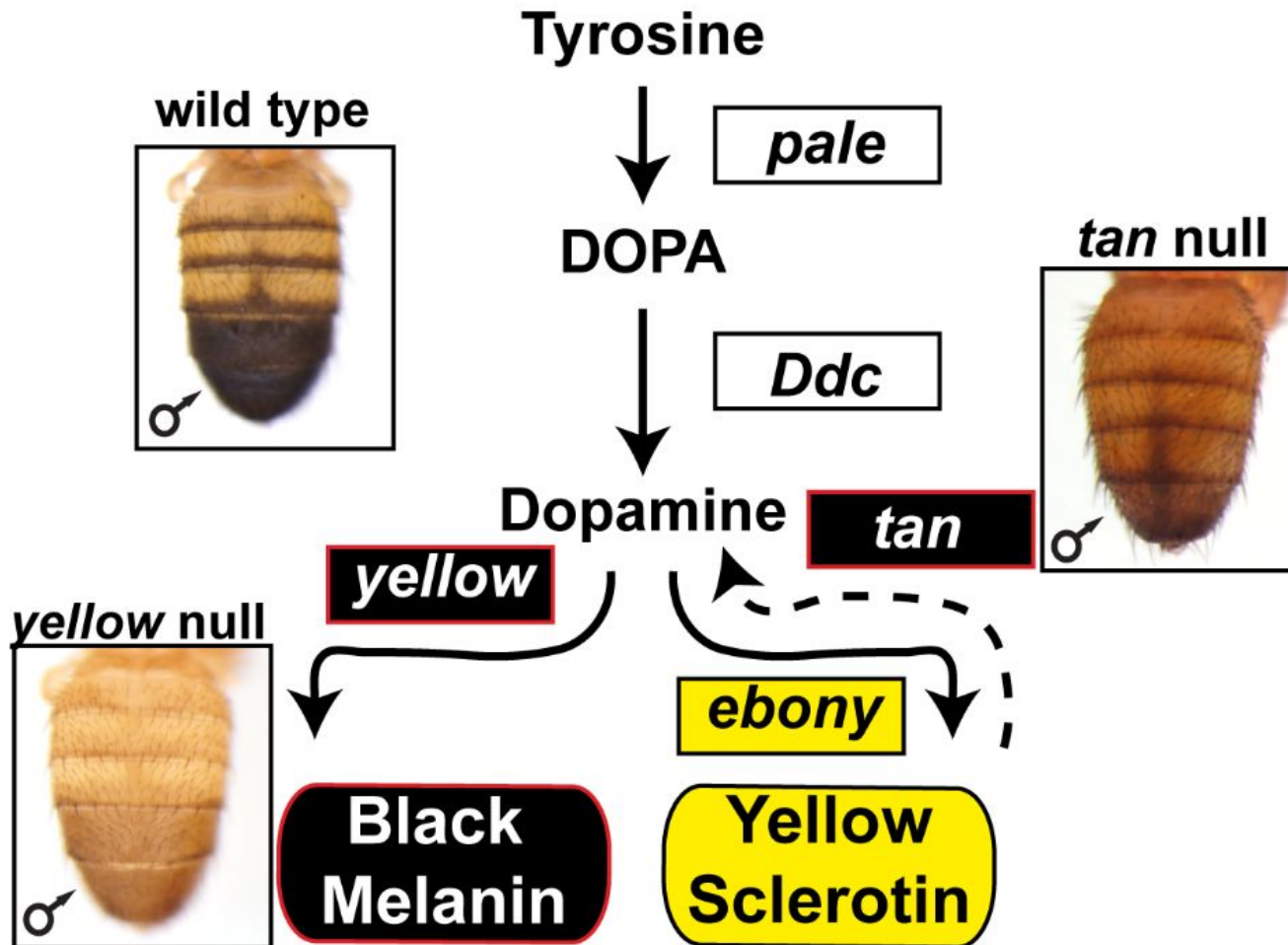


Bonn and Furlong
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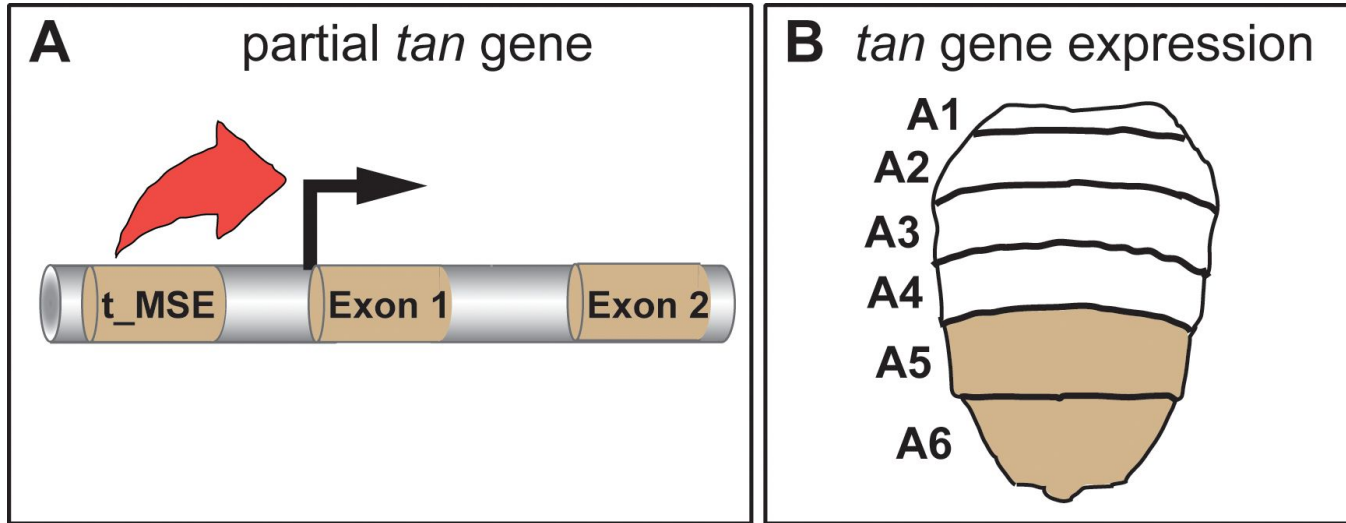
Fruit Fly Pigmentation as a Model Evo-Devo Trait



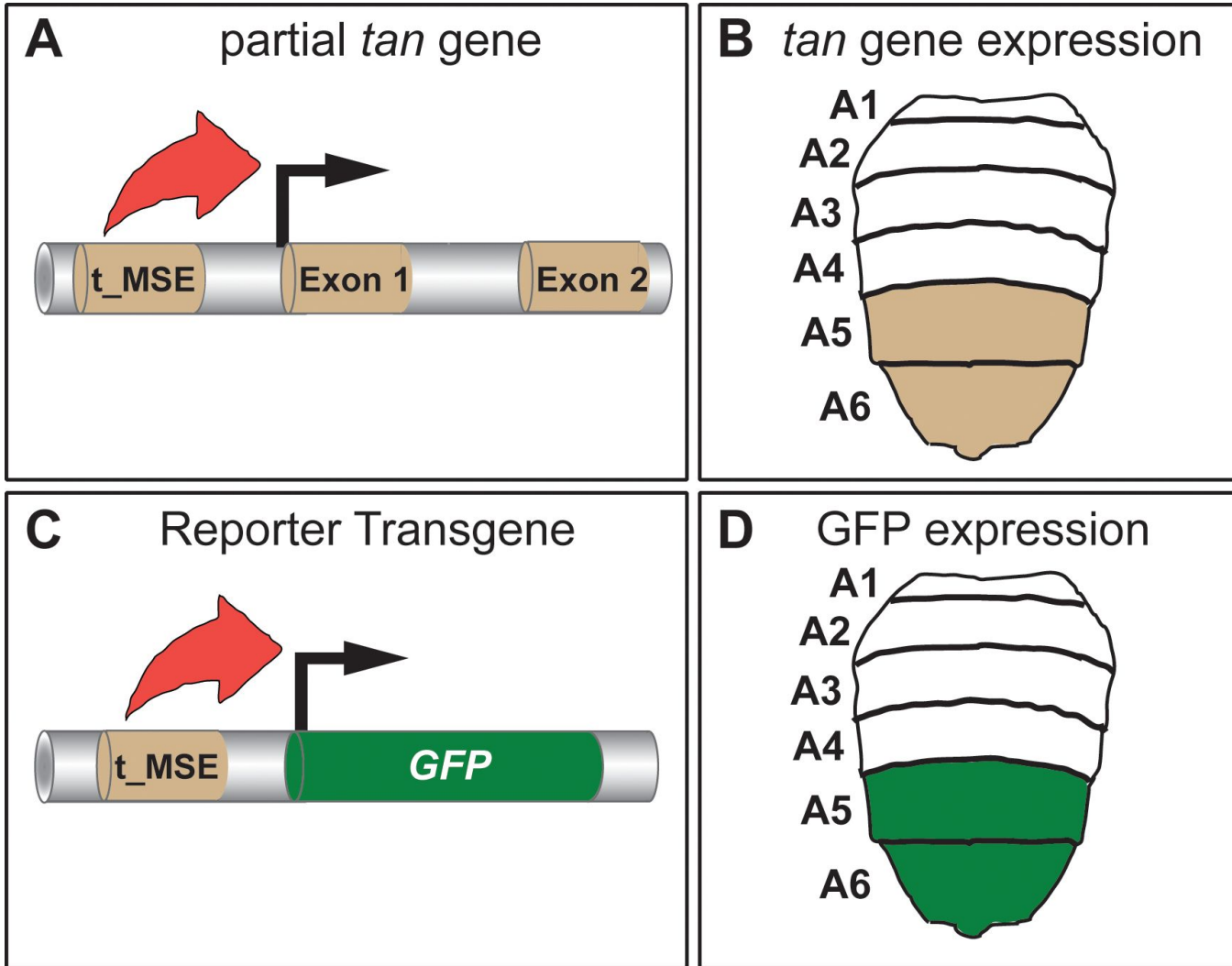
Fruit Fly Pigmentation Pathway



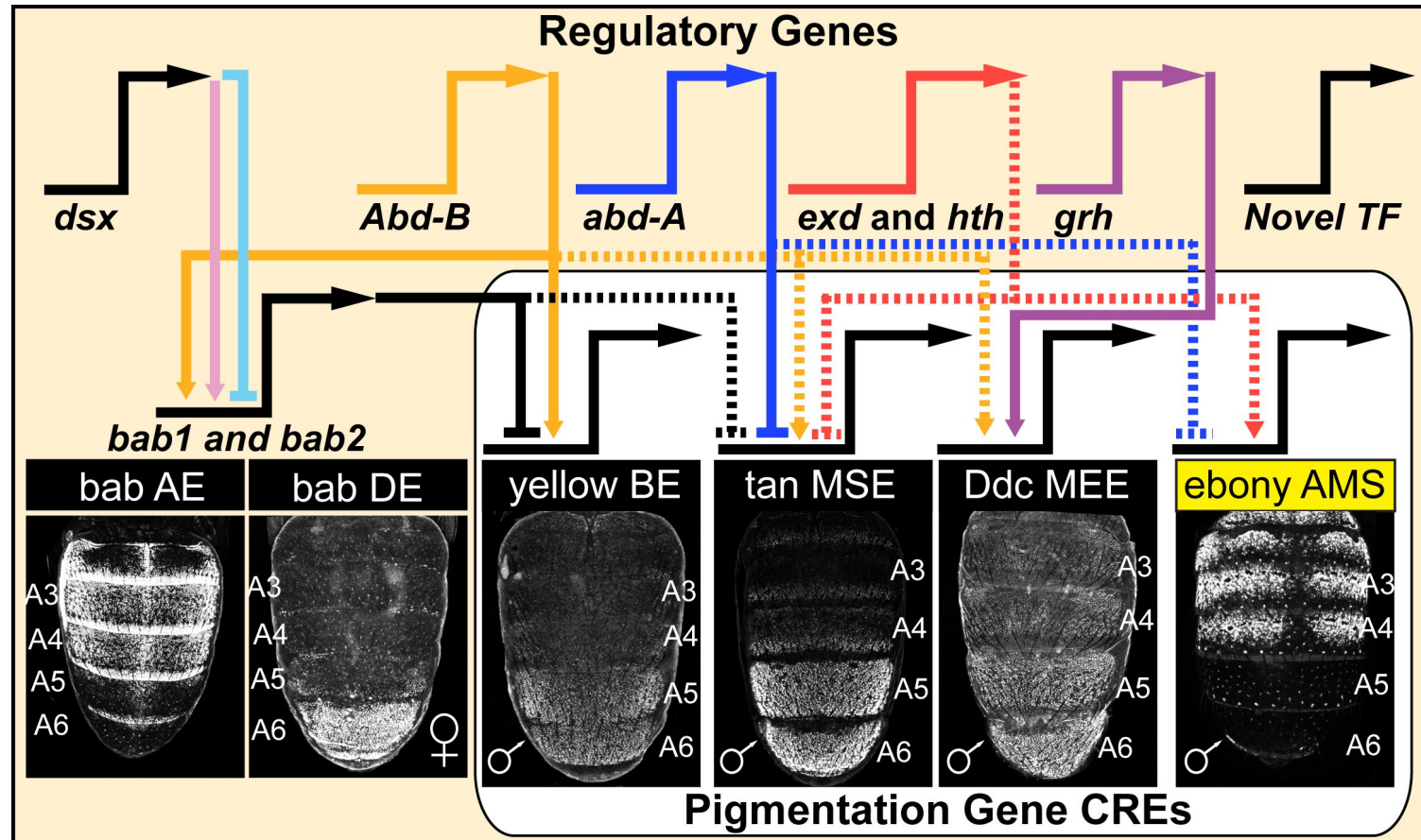
Reporter transgenes make CRE activities visible



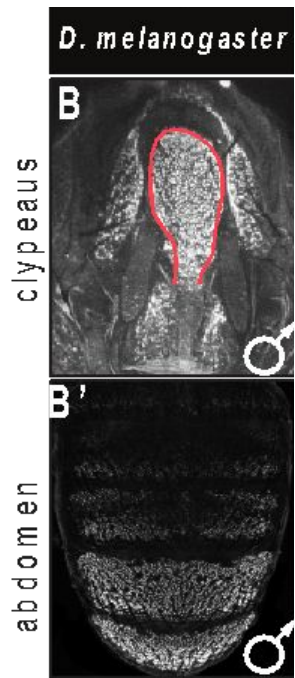
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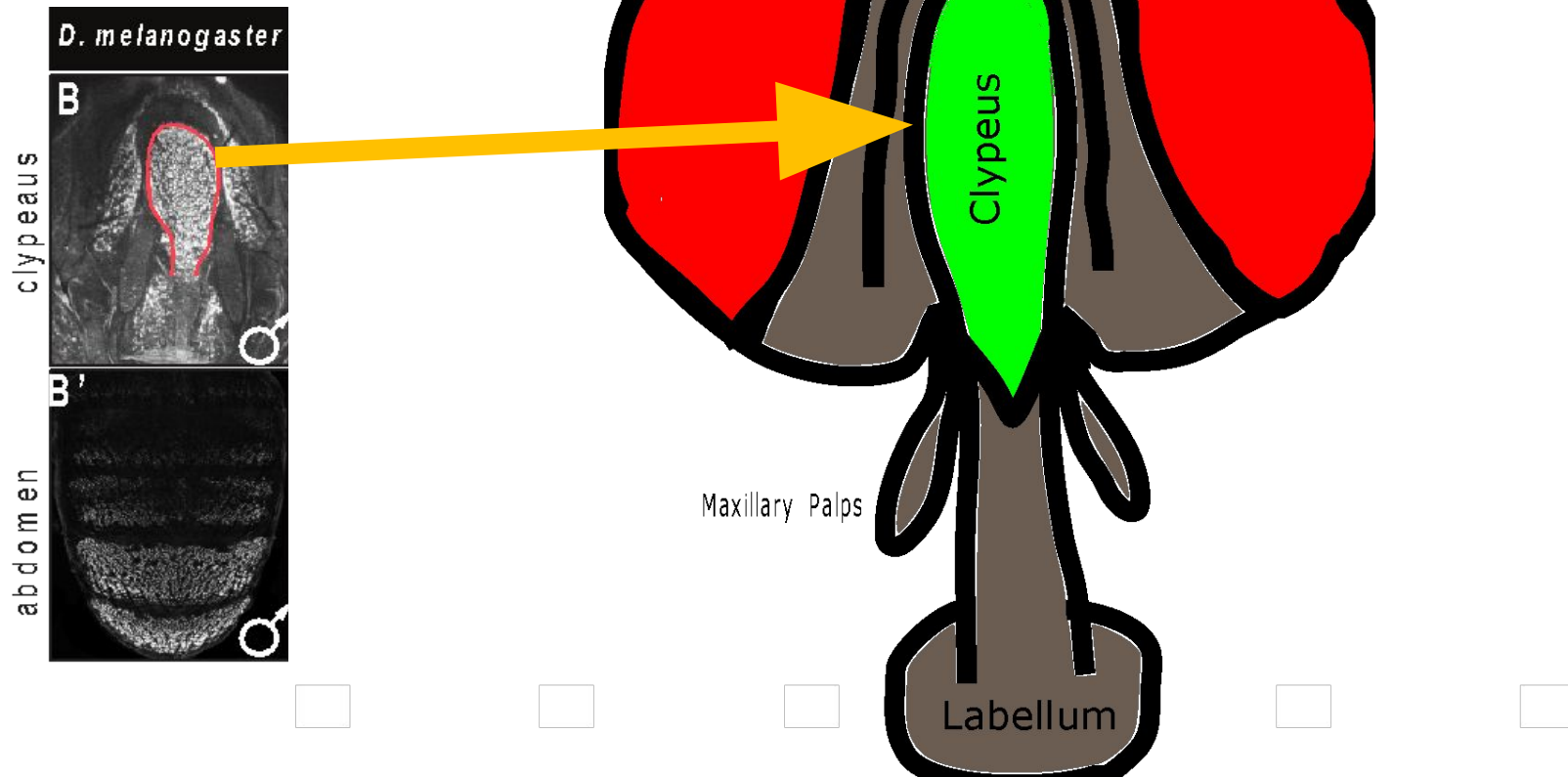
A Rudimentary GRN and its Core CREs for a Derived Trait



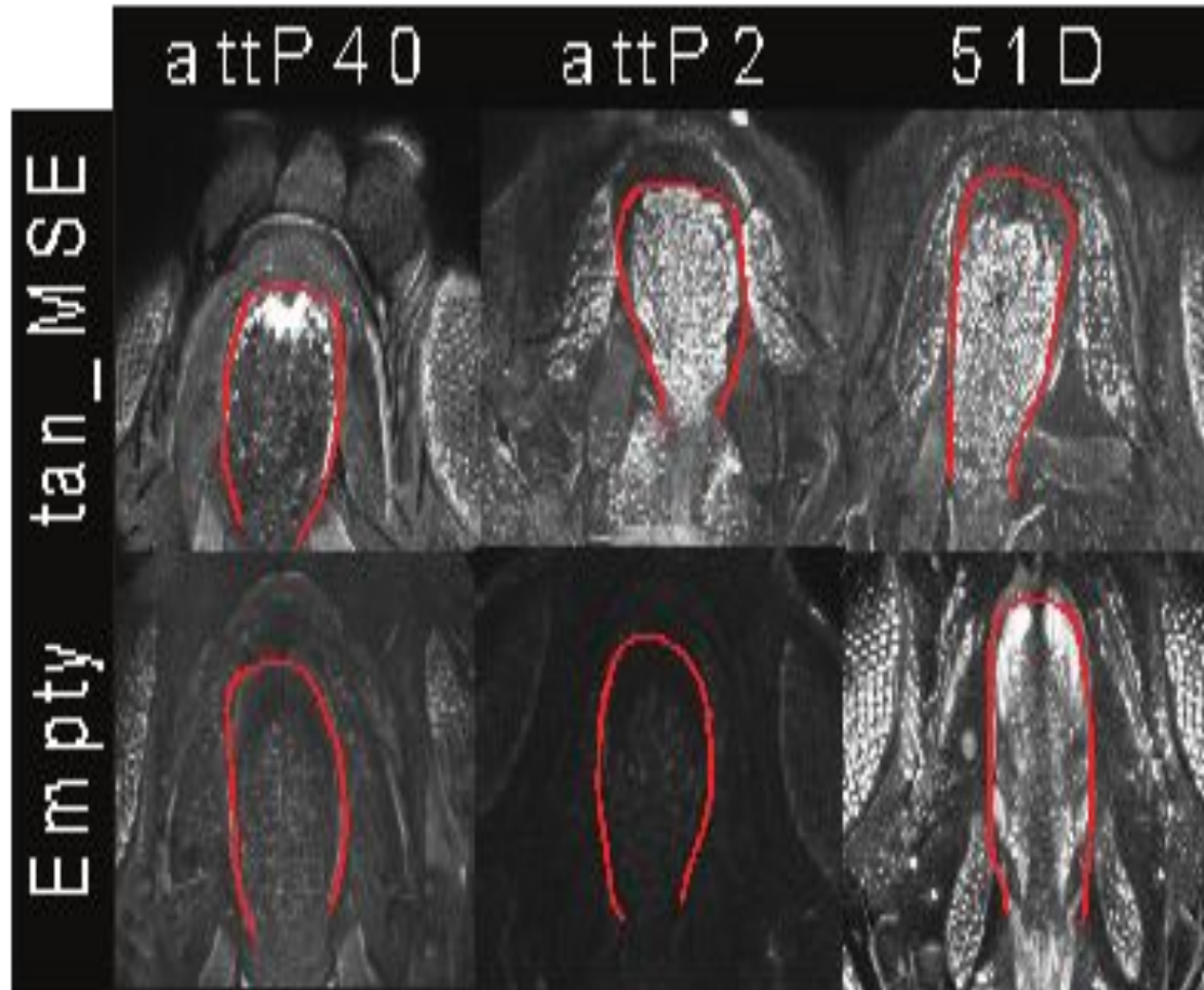
Evidence for pleiotropic activity of the t_MSE



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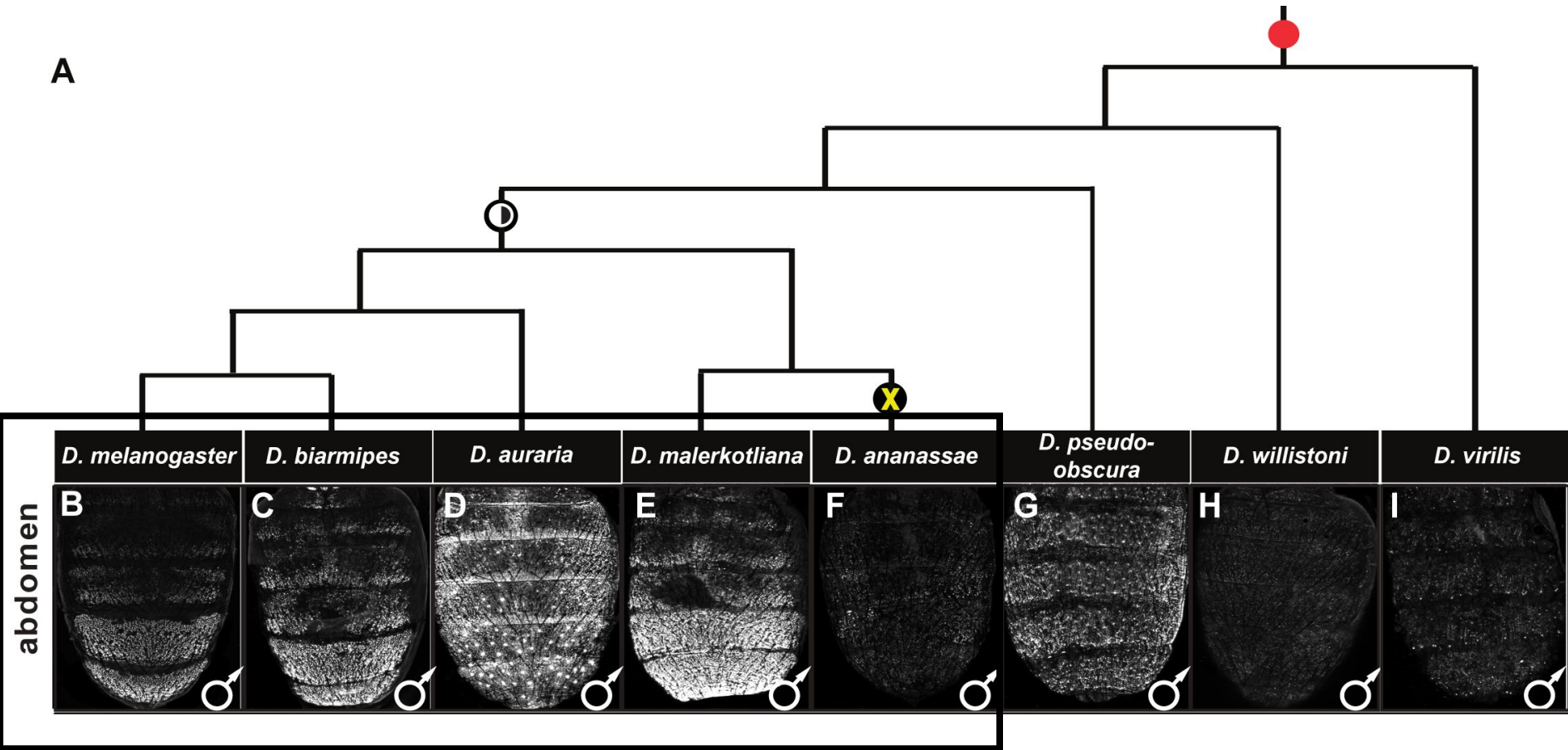


Clypeus activity is robust to transgene location



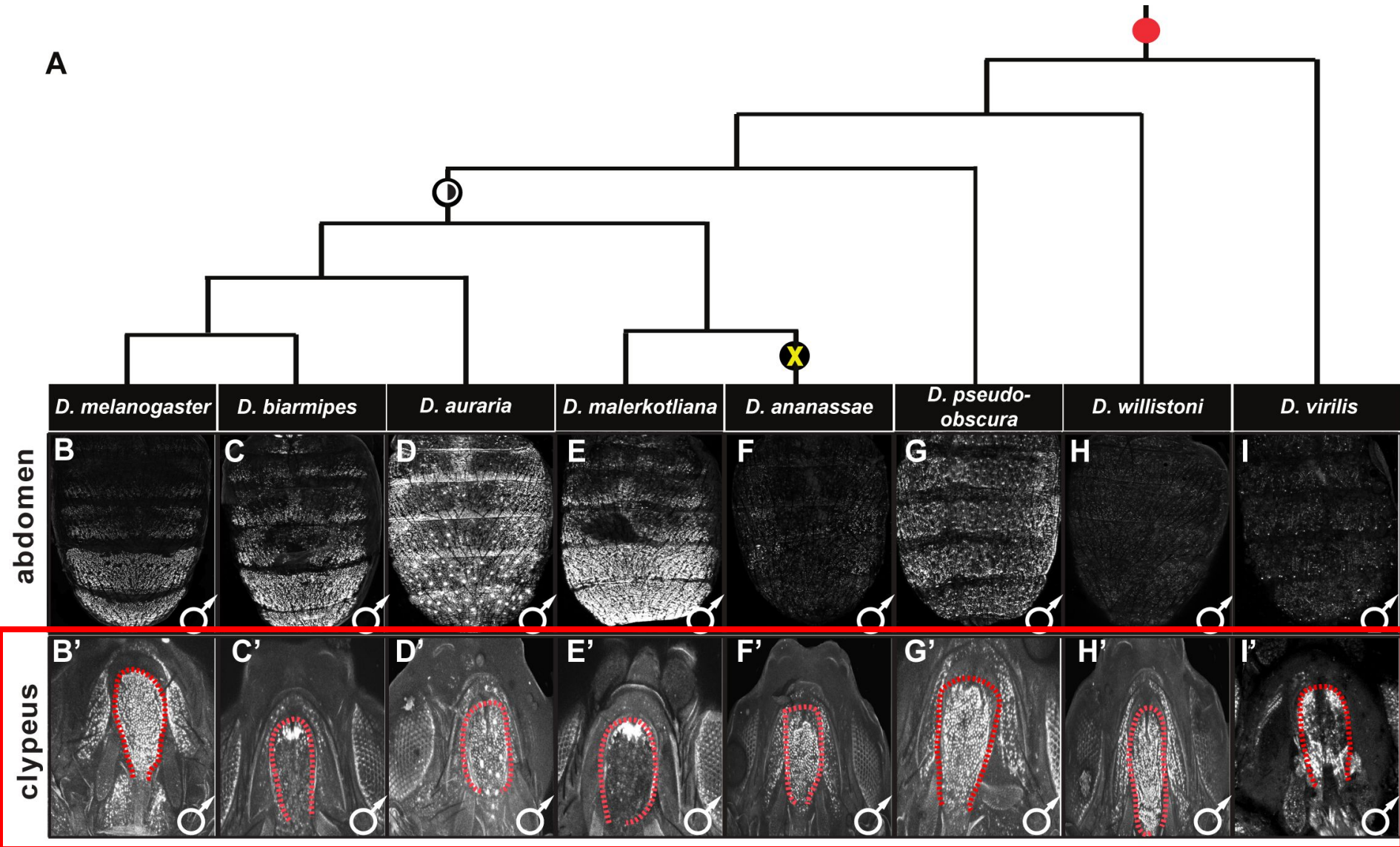
When did the two CRE activities originate?

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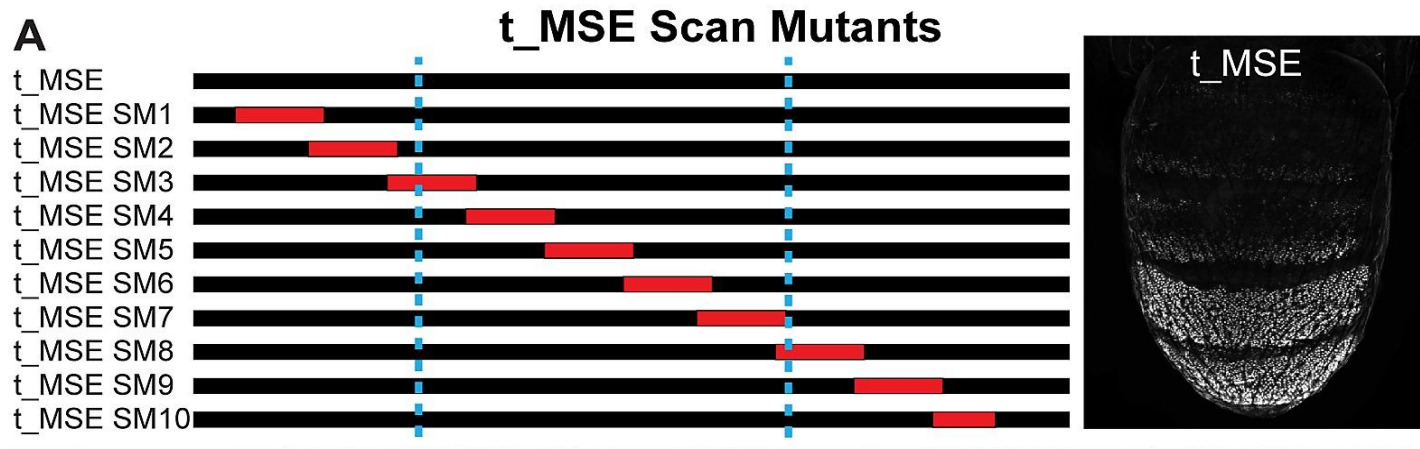


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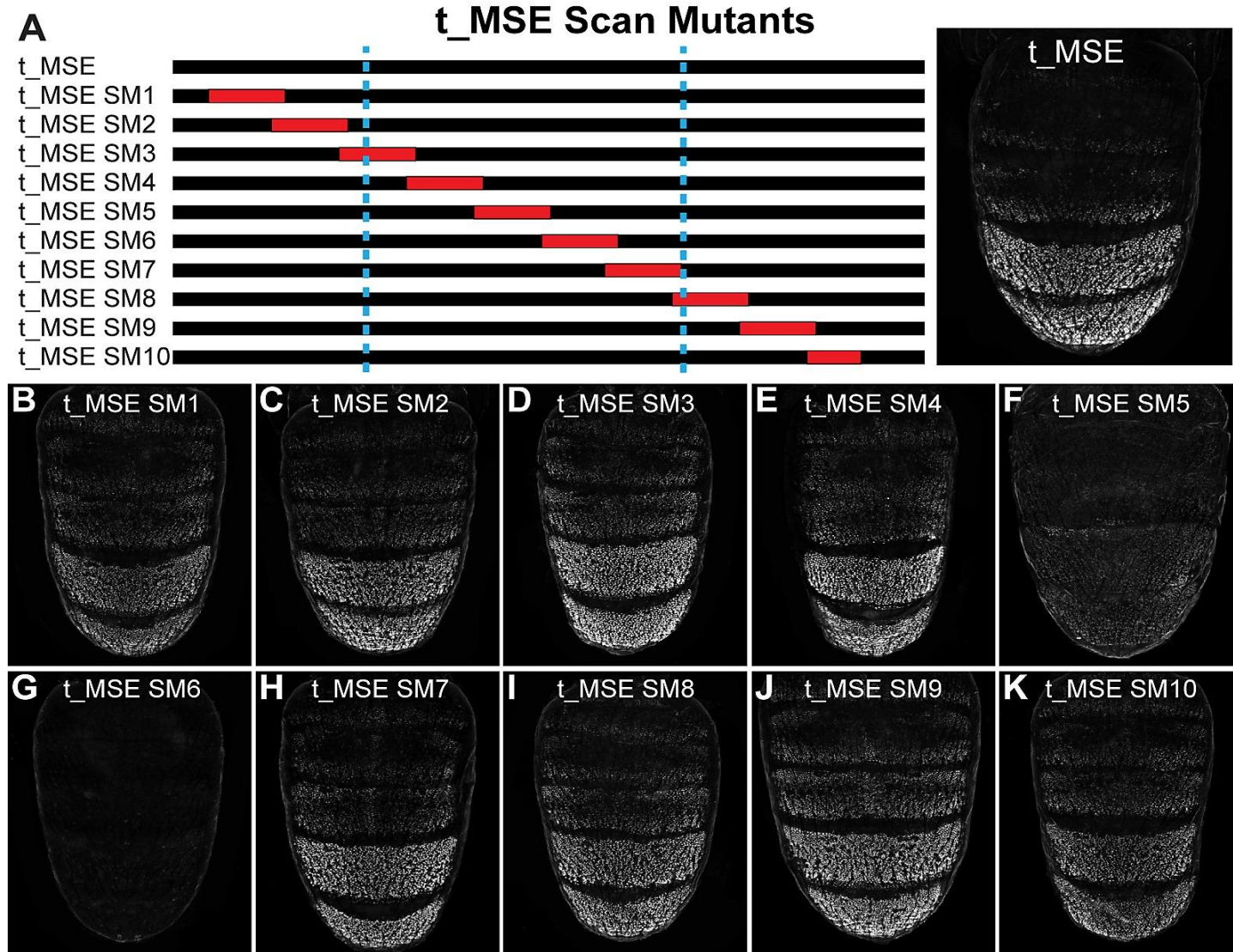
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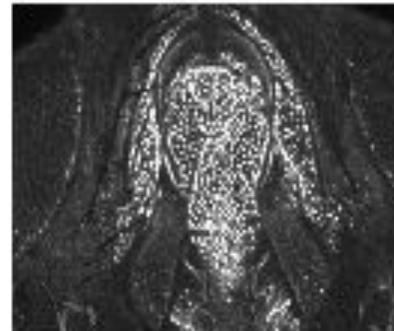
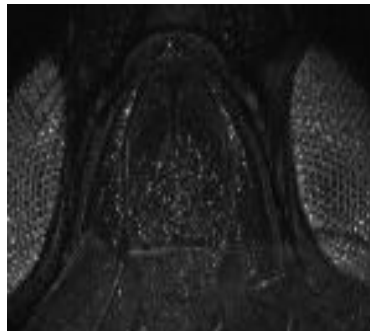
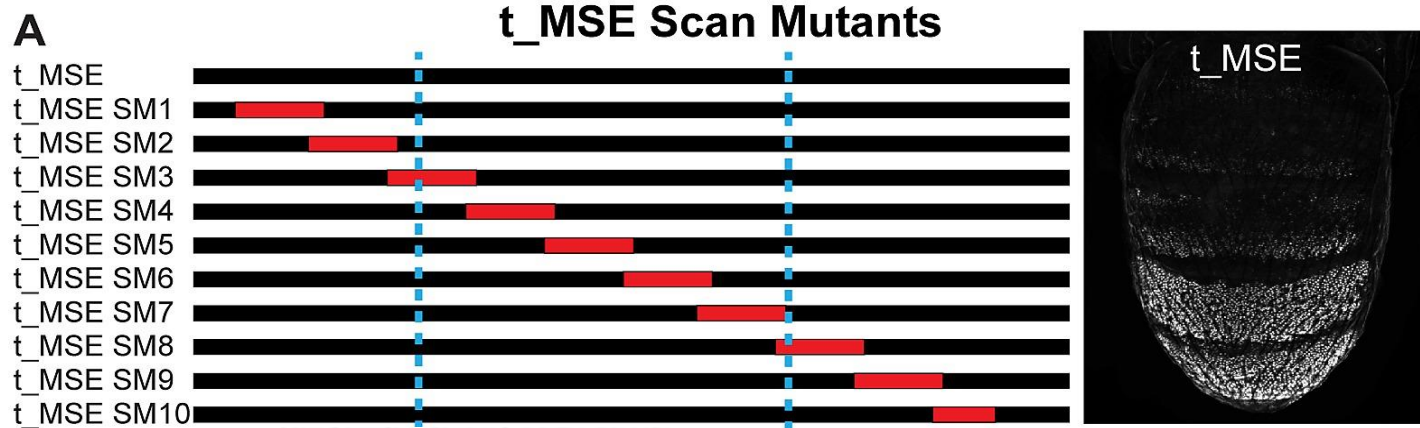
How are pleiotropic activities encoded in DNA sequence?



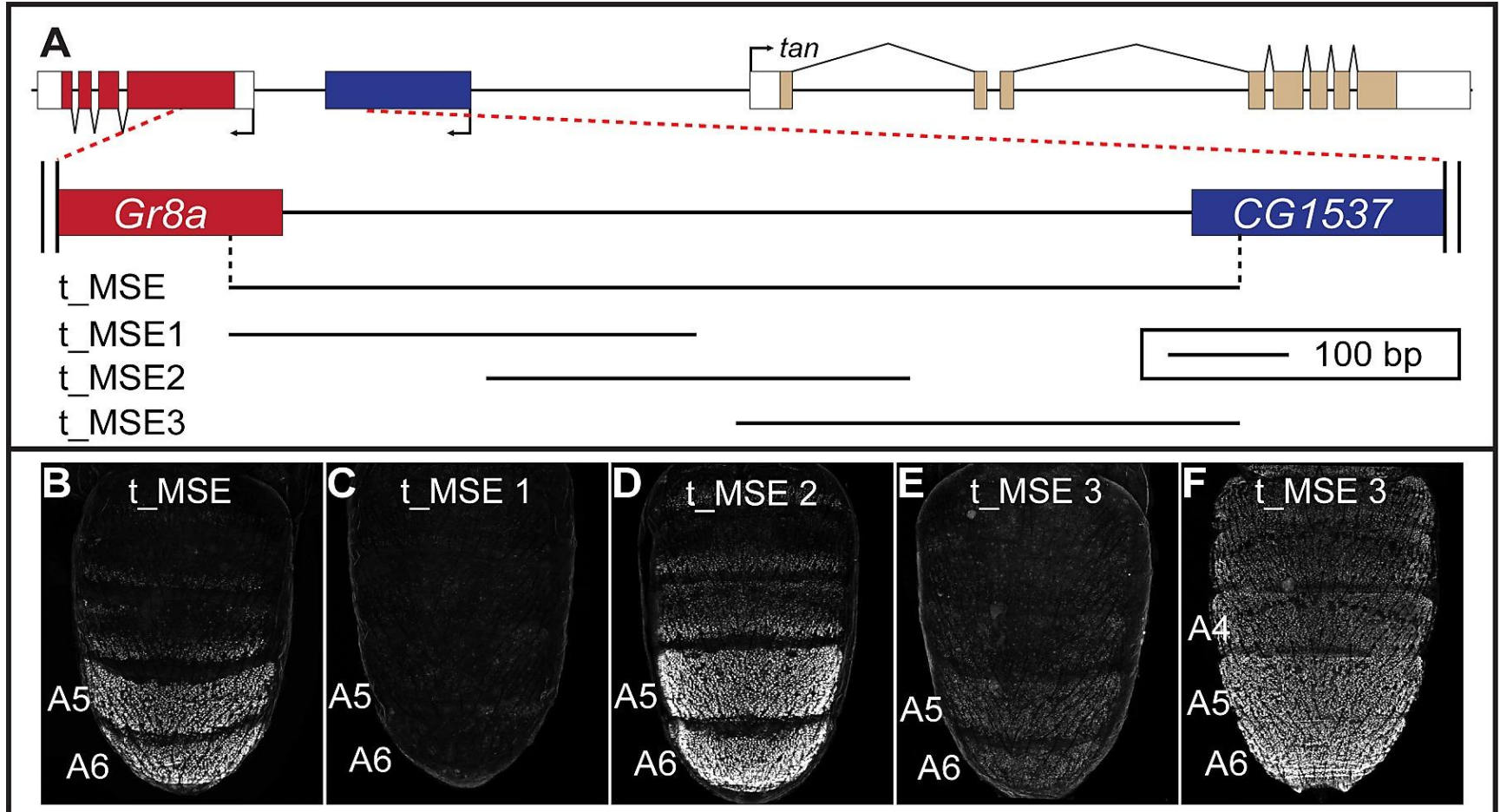
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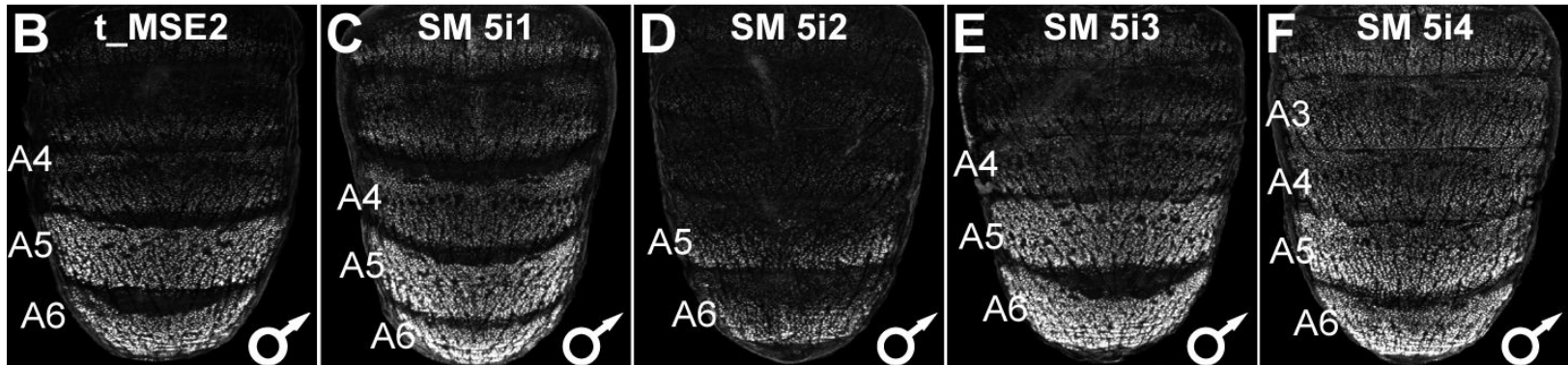


Investigating the abdominal role of the t_MSE1, 2 & 3



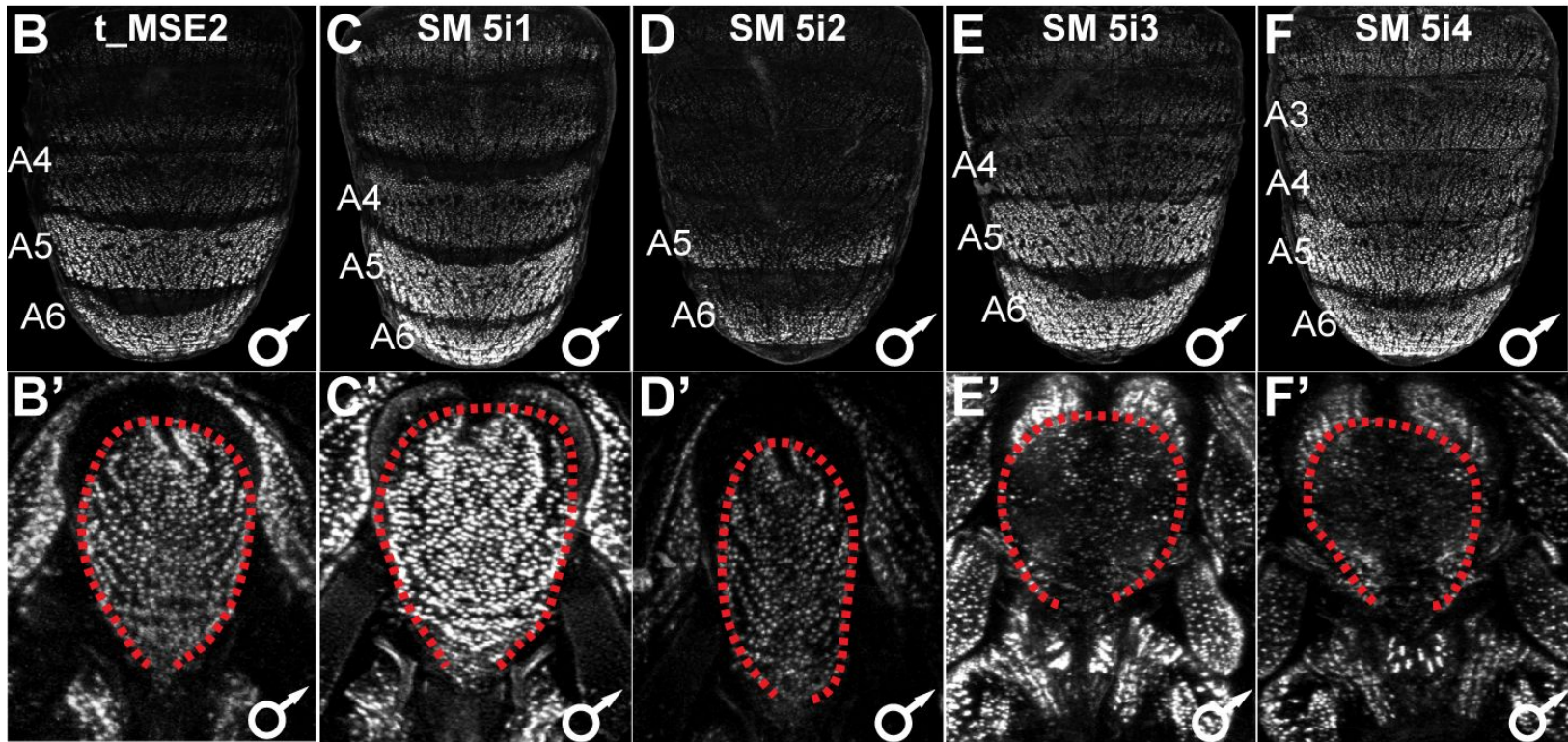
Fine-scale mapping of abdomen and clypeus sequences

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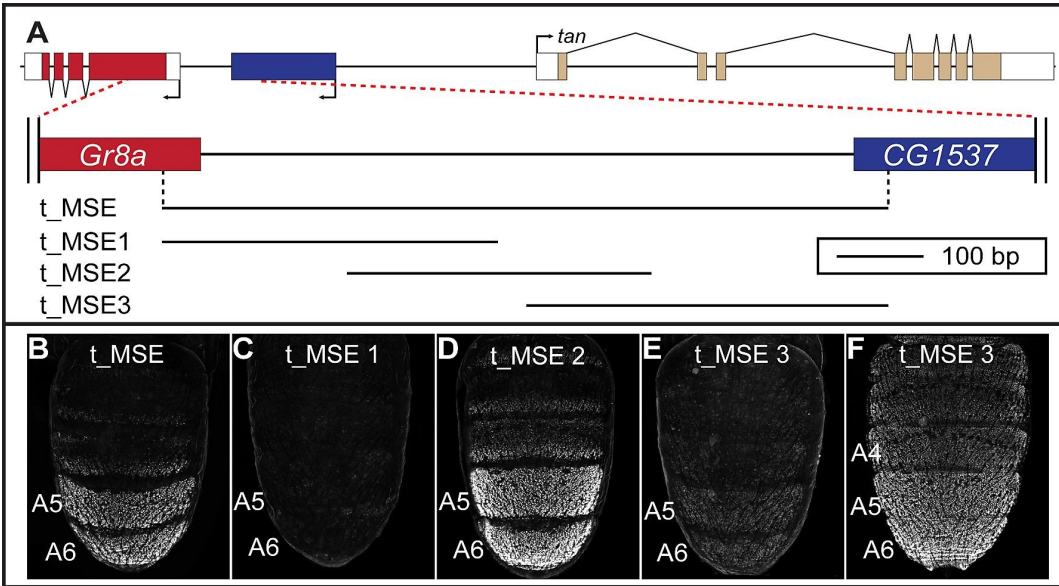
Further investigation of the clypeus role of the t_MSE

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Future Directions

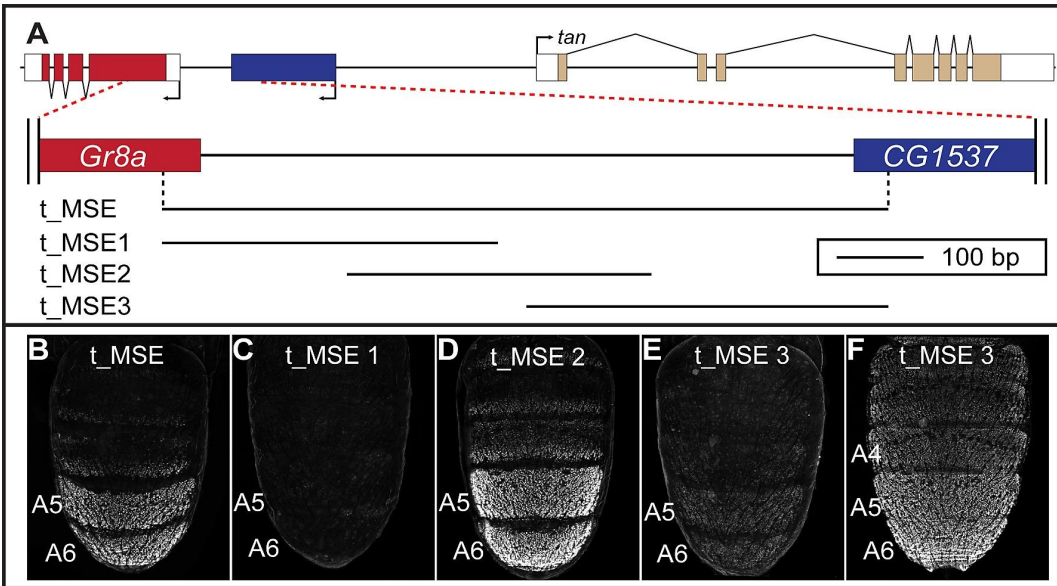
Future Directions



1. Which gene is actually expressed in the clypeus?

2. Does the regulated gene actually play a role in clypeus biology?

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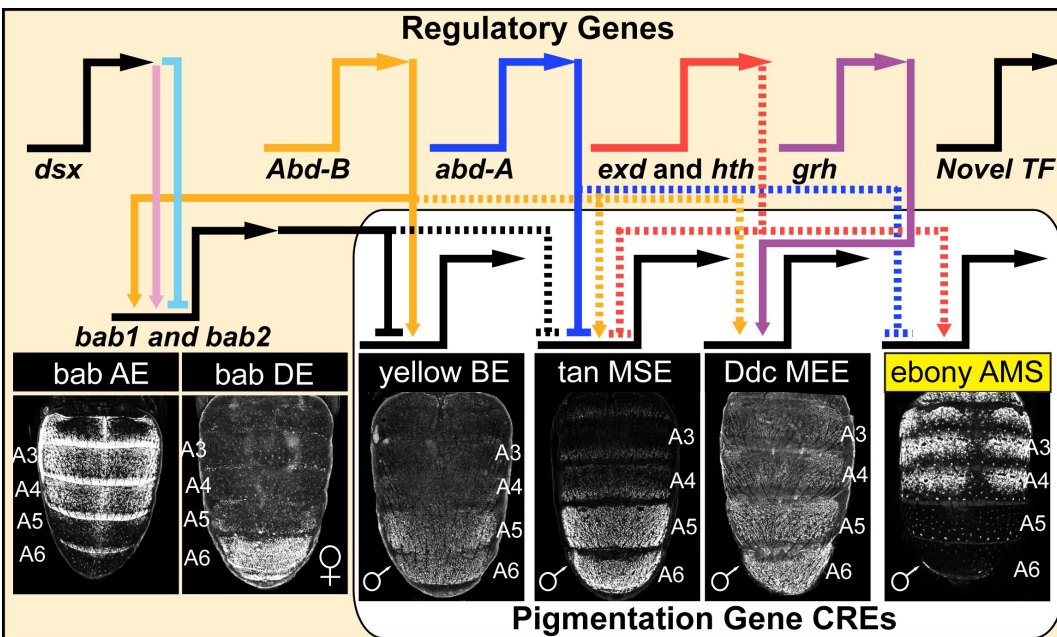


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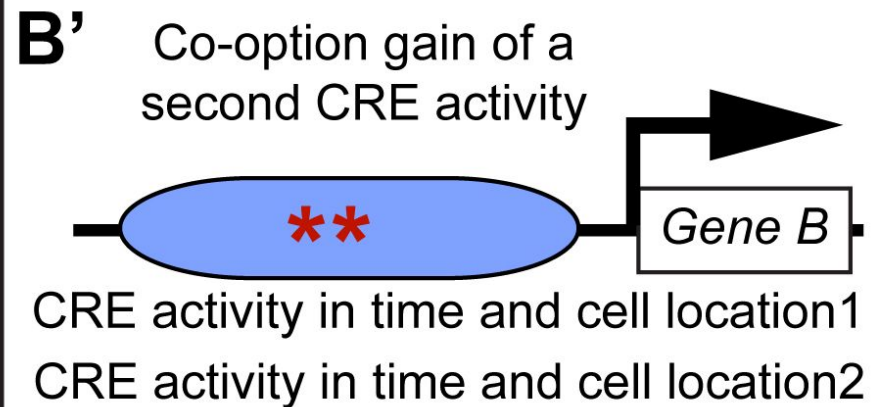
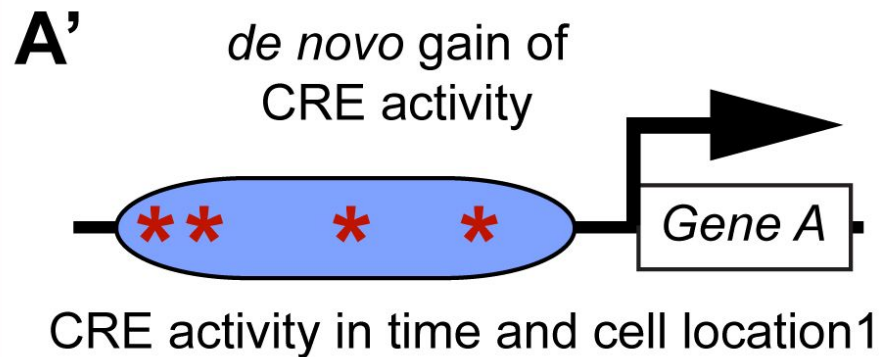
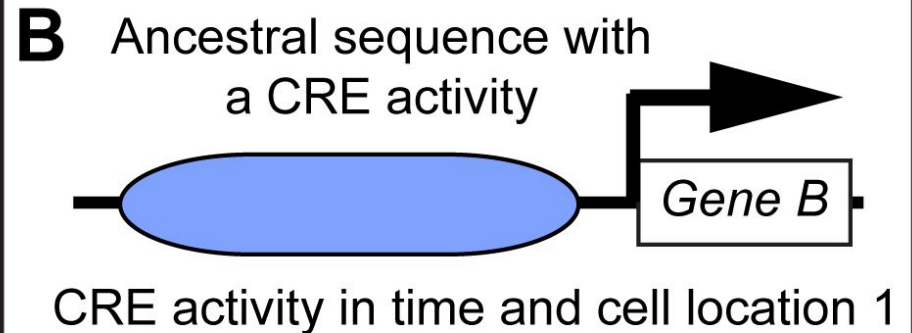
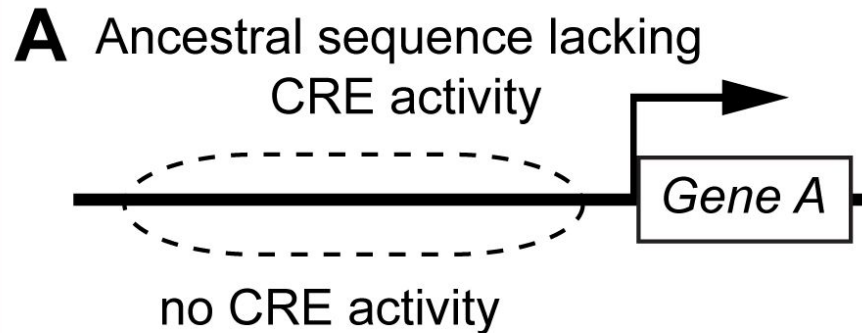
2. Does the regulated gene actually play a role in clypeus biology?

3. What transcription factors are responsible for clypeus activity?

4. Do other pigmentation GRN CREs have clypeus activity, or another pleiotropic activity?



How do the regulatory logic of CREs evolve?



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